FINAL REPORT
2004-05 AND 2005-06
Scholarship of Teaching and Learning (SoTL) in Higher Education Small Grant Program

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SoTL Related to College Teaching and Learning

The definition of SoTL at Illinois State University is, "systematic reflection on teaching and learning made public". The definition includes work related to classroom research and assessment in a discipline. The project related to this definition of SoTL by conducting classroom research and assessment in a discipline for the purpose of addressing a teaching-learning problem within the context of developing learner autonomy. The problem considered was enhancing teaching-learning of applied mathematics taught in FCS courses by focusing on learner autonomy.

Focus on Promoting Learner Autonomy

According to Little learner autonomy is the "capacity for detachment, critical reflection, decision making, and independent action" (1991). This project was structured to encourage students to take responsibility for their mathematical work by establishing goals and developing plans that were based upon how and when they want to learn. Students applied learner autonomy principles established by Benson and Voller (1997): a) a set of skills which can be learned and applied in self-directed learning, b) an inborn capacity which is suppressed by institutional education, c) exercise of learners' responsibility for their learning, and d) the right of learners to determine the direction of their learning.

Project Outcomes

Using the conceptual framework suggested by Cross and Steadman (1996), the educators developed and implemented classroom research that focused on improving teaching-learning of applied mathematics in FCS courses by focusing on learner autonomy. Triangulation was used in this study to formulate valid propositions. Triangulation revealed different aspects of the empirical reality which was unattainable by the potentially restrictive framework of a single method. For the purposes of this study triangulation took the form of combining quantitative and qualitative methodologies to measure various elements.

Quantitative Data Collection

- Survey instruments were distributed to students in FCS 103, 338, and 347 for the purposes of determining: a) perceptions of performing mathematical calculations and b) the importance of mathematical calculations to FCS careers.

Qualitative Data Collection

- Results of mathematical calculations on quizzes performed by students in the classroom.
- Interviews conducted with colleagues at other national institutions for the purpose of determining the importance of performing mathematical calculations in FCS careers.
- Observations of students working in groups as they performed mathematical calculations for an experiential learning assignment. Students working in groups were required to record measurements of interior spaces, draw floor plans, and develop a model of the interiors. Each group was assigned a specific area of the

building and was required to share their measurements with the other groups in the class. In order to develop the drawings and a model of the building accurate measurements and calculations from each group was essential. The completed projects demonstrated accurate and precise calculations. Architectural drawings and the scaled model of the building reflected the dimensions of the original structure.

Classroom Research Findings 2004-2006

The results of the **2004-2006** quantitative and qualitative data reveal the following results:

1) Students in FCS 103, 338, and 347 perceived that performing mathematical calculations is very challenging, but important for their careers.
2) Regardless of student perceptions regarding the importance of performing mathematical calculations, the quiz results revealed that students consistently had mathematical errors, and appeared to lack an understanding of the underlying concepts associated with the practical applications.
3) Colleagues at other national institutions supported performing mathematical calculations in FCS careers and stressed the importance of being able to perform mathematical calculations without the assistance of software programs.
4) Mathematical calculations were very accurate when students worked in groups and when the project outcomes were dependent upon accurate calculations.

Implications for Policies and Practice

The classroom research results for data collected in **2004-2006** provide policies and practice that focus on learner autonomy for teaching-learning mathematics in FCS courses. Recommendations include the following:

Develop activities that focus on group discussions

To enhance the teaching-learning of applied mathematics the group discussion process can facilitate:

a. An understanding of performing mathematical calculations by demonstrating to the students that they can contribute to the learning process;
b. An exchange of ideas and approaches to performing accurate mathematical calculations;
c. An exploration of various perspectives regarding the importance of accurate mathematical calculations;
d. The development of the confidence that is required for students to be responsible for their learning; and
e. Learner autonomy by enabling students to identify the best approach to performing mathematical calculations.

Develop activities that focus on experiential applications

Experiential applications can facilitate the teaching-learning of performing mathematical calculations by demonstrating the importance of the calculations and the real consequences of mathematical errors.

Identify student perceptions regarding the importance of a task

In support of Benson and Voller (1997) understanding the importance of a task assists in the development of a set of skills which can be learned and applied in self-directed learning.

Develop group and experiential activities throughout a curriculum.

To facilitate the vertical integration of applied mathematics taught in courses in a FCS department the recommendations for best practice should be applied throughout the FCS curriculum.